OCR
A Level
Computer Science

H446 – Paper 1

4

Introduction to SQL

Unit 4
Exchanging data

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Oxford Cambridge and RSA

An OCR endorsed
teaching and learning tool

Objectives

- Be able to use SQL to retrieve data from multiple tables of a relational database

- Be able to interpret and modify SQL

SQL

- SQL (pronounced S-Q-L or Sequel) stands for Structured Query Language

- It is a declarative language used for querying and updating tables in a relational database

- It can also be used to create tables

- You can create SQL statements in a programming language such as Python to access and manipulate a database

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SELECT .. FROM .. WHERE

- The SELECT statement is used to extract fields from one or more tables

- The syntax of the statement is:

  SELECT *list of fields to be displayed*

  FROM *list the table or tables the data will come from*

  WHERE *list of search criteria*

  ORDER BY *list the fields that the data is to be sorted on*

  (ASC or DESC, default is ASCending order)

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The SELECT statement

tblProduct

productID	productName	subject	level	price
p24	Equations	Maths	2	£12.00
p36	Programming	Comp Science	4	£5.00
p47	Database	Comp Science	4	£5.00

- Which products will be selected by the following SQL statement, and in what order?

SELECT productID, productName, subject, price

FROM tblProduct

WHERE level = 4

ORDER BY productName

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SQL Results

productID	productName	subject	level	price
p24	Equations	Maths	2	£12.00
p36	Programming	Comp Science	4	£5.00
p47	Database	Comp Science	4	£5.00

SELECT productID, productName, subject, price

FROM tblProduct

WHERE level = 4

ORDER BY productName

Results

productID	productName	subject	price
p47	Database	Comp Science	£5.00
p36	Programming	Comp Science	£5.00

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ORDER BY

- You can sort the results of an SQL query in ascending or descending sequence

- To order in descending sequence, specify DESC

- Optionally, you can specify ASC (this is assumed if neither ASC or DESC is specified)

SELECT productID, productName, subject, price

FROM tblProduct

WHERE level = 4

ORDER BY price DESC, productName ASC

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Using a wild card

tblProduct

productID	productName	subject	level	price
p24	Equations	Maths	2	£12.00
p36	Programming	Comp Science	4	£5.00
p47	Database	Comp Science	4	£5.00
p54	Hardware	Computing	3	£6.00

- You can use a "wild card" * to mean "all" or "one or many characters"

  SELECT *

  FROM tblProduct

  WHERE subject LIKE "Comp*"

- "LIKE" is used to search for a pattern

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Operators in the WHERE clause

productID	productName	subject	level	price
p24	Equations	Maths	2	£12.00
p36	Programming	Comp Science	4	£5.00
p47	Database	Comp Science	4	£5.00
p54	Hardware	Computing	3	£6.00

- You can also use the following in SQL queries:

BETWEEN between an inclusive range

IN   specify multiple possible values for a column

For example:

SELECT *
FROM tblProduct
WHERE price BETWEEN 5.00 AND 10.00

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Operators in the WHERE clause

- The following operators may be used in the WHERE clause

= <> > < >= <= AND, OR, NOT

SELECT *

FROM tblProduct

WHERE subject LIKE "Comp*" AND level = 4

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Use of semicolon

- Some database systems require a semicolon at the end of each SQL statement

- A semicolon is the standard way to separate each SQL statement

- Do NOT put a semicolon at the end of each line

SELECT *

FROM tblProduct

WHERE subject LIKE "Comp*" AND level = 4

Note: Semicolons are not used in these SQL examples

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Worksheet 4

- Try the questions in **Task 1** and the practical exercise in **Task 2** on the worksheet

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Extracting data from multiple tables

- Using SQL, you can combine data from two or more tables by specifying the links between the tables

- In the RevisionSubs database created in Worksheet 2, there are three tables:

  tblCustomer (custID, title, firstname, surname, email)

  tblSubscription (subID, startdate, endDate, *custID*, *productID*)

  tblProduct (productID, productName, subject, level, price)

- What do the italics in the definition of

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Specifying links between tables

- Write SQL to show the customer ID and surname with the IDs and names of any products they subscribe to:

tblCustomer (<u>custID</u>, title, firstname, surname, email)

tblSubscription (<u>subID</u>, startdate, endDate, *custID*, *productID*)

tblProduct (<u>productID</u>, productName, subject, level, price)

SELECT tblCustomer.custID, surname, tblProduct.productID, productName

FROM tblCustomer, tblProduct, tblSubscription

WHERE tblSubscription.custID = tblCustomer.custID

AND tblSubscription.productID = tblProduct.productID

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Attributes from linked tables

- When you are selecting attributes from linked tables, if the attribute name occurs in more than one table, you should specify the table name

- If the attribute name occurs in only one table, specifying the table name is optional

SELECT tblCustomer.custID, surname, tblProduct.productID, productName

FROM tblCustomer, tblProduct, tblSubscription

WHERE tblSubscription.custID = tblCustomer.custID

    AND tblSubscription.productID = tblProduct.productID

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Using the JOIN keyword

- Data from two linked tables can be extracted using the JOIN keyword (an alternative to WHERE clause)

- An example of two tables linked in a one-to-many (1:M) relationship:

    tblTeam(teamID, teamName, manager)

    tblPlayer(playerID, surname, firstname, teamID)

- To display all the players on Team "Binham":

    SELECT tblPlayer.surname, tblPlayer.firstname, tblTeam.teamName
    FROM tblTeam, tblPlayer
    JOIN tblPlayer
    ON tblTeam.teamID = tblPlayer.teamID
    WHERE team.teamName = "Binham"

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Worksheet 4

- Try the questions in **Task 3** on the worksheet
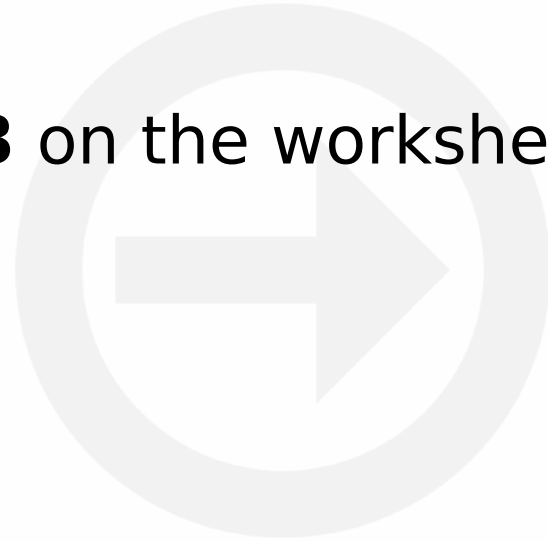
Plenary

- Memorise the main SQL keywords, clauses and formats

  SELECT…

  FROM …

  WHERE …

  ORDER BY …

- Use keyword LIKE and wildcard * when appropriate

- Be familiar with the JOIN … ON clause

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